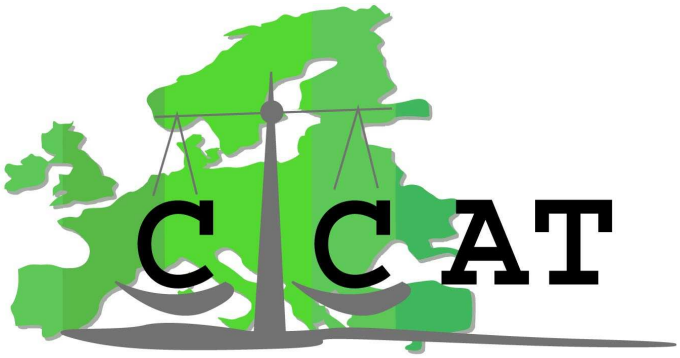

Cross Compliance Assessment Tool

CROSS-COMPLIANCE ASSESSMENT TOOL

Policy-oriented research:
Scientific support to policies SSP

Specific Targeted Research Project (STREP)

Deliverable 2.5

Design of the CCAT analytical tool (prototype 1) specifying the types of output to be produced and the functionalities required to produce the final impacts

Due date of deliverable: 31-07-2007

Actual submission date: 05-02-2008

CROSS-COMPLIANCE ASSESSMENT TOOL
EC contract number 44423-CCAT
Project duration: January 2007-December 2009

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Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	RE
CO	Confidential, only for members of the consortium (including the Commission Services)	

Contents

Executive summary

This deliverable aims at explaining the requirements the CCATool should meet. The initial requirements for the tool were specified in the demo version of the tool presented at the first end-user meeting of CCAT. At this meeting comments and further suggestions were obtained on the requirements for the tool. Requirements have also been collected from the CCAT scientists, and these are all described in this report including how these have been translated into a first preliminary design of the CCAT prototype I.

Chapter 1 gives an introduction on the report.

In Chapter 2 a description is given of a part of the CCAT-DEMO in order to explain what the CCAT Integrated assessment tool might look like. We aim at a tool that will be quick and easy to use. Therefore, no complex models will be integrated in the tool, only simplified (meta)models, and qualitative expert knowledge rules. The tool will provide pre-defined scenarios, which may be redefined by the user. These scenarios may differ in the level of compliance of different farm types for different SMRs and GEACs in different member states and/or nuts2 regions.

In Chapter 3 a description is given of the response of the end-users to the CCAT-DEMO and their requirements to the CCAT tool as obtained during the first CCAT end-user meeting held in Brussels in May 2007. This is followed by the internal requirements to the system as obtained from all CCAT partners collected in internal meetings and a survey, including an overview of the standards that will be implemented in prototype 1.

In Chapter 4 an overview is given of the indicators that will be implemented in the first prototype. Successively the economic indicators, the environmental indicators, the indicators for land use, landscape and biodiversity and the indicators for public health and animal welfare are outlined. Next a description is given of the preliminary design of the CCATool prototype I, in terms of general technical design and functionalities. The technical design is still under development, therefore the design might still change in a later stage of the project.

1 Introduction

1.1 Introduction

On the 16th of May 2007 the first CCAT End-user meeting was organised in Brussels in order to discuss the initial approach and the requirements for assessing the impacts of Cross Compliance in the different parts of the EU with the integrated assessment tool to be developed in this project. For this meeting a first demo-version of the CCAT integrated assessment tool, the so-called CCAT-DEMO was developed and presented and discussed at the meeting. In addition to this an internal CCAT survey was also held among all scientists in the project to get further response to the Demo-version and their ideas on what the main output can be of the assessment and what functionalities should be integrated in the CCATool.

This deliverable aims at explaining our ideas on the CCATool as illustrated by the demo version, discussing the comments and suggestions obtained from the end-users during the end-user meeting and after from the CCAT scientists, and describing how these have been translated into a first design of the CCAT prototype I in terms of general technical design and functionalities. (For a more detailed description of the technical design we refer to D5.1.)

1.2 Outline of report

In the next chapter first a description is given of the CCAT-DEMO in order to explain what the CCAT Integrated assessment tool might look like. In Chapter 3 a description is given of the response of the end-users to the CCAT-DEMO and the requirements to the CCAT tool as formulated by the different participating scientists in the project. Chapter 4 describes the functionalities of the tool in the form of the selection of indicators for the first prototype, and a short description of the preliminary design of the CCATool, prototype 1, based on these requirements.

2 An illustration of the functionalities and the user-interface (CCAT demo version)

In this chapter a description is given of the CCAT-DEMO in order to explain what the CCAT Integrated assessment tool might look like.

We aim at a tool that will be quick and easy to use. Therefore, no complex models will be integrated in the tool, only simplified models, and qualitative expert knowledge rules.

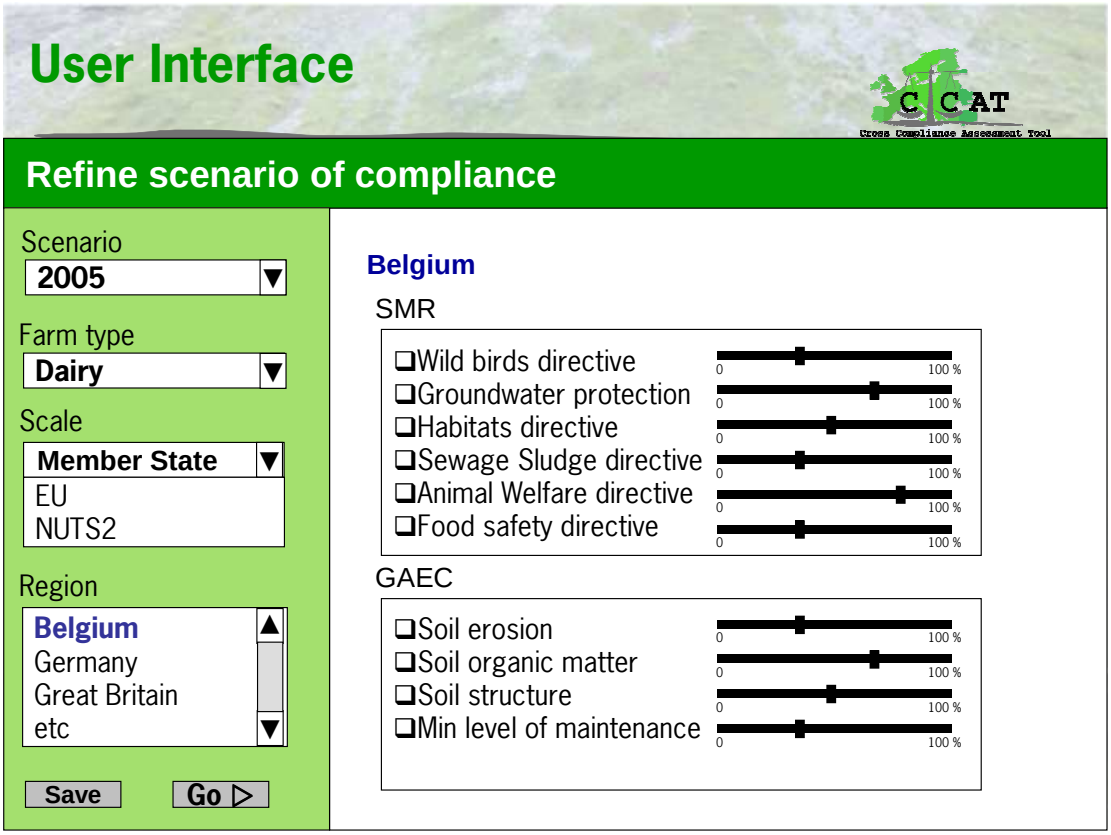
The tool will provide pre-defined scenarios, which may be redefined by the user. These scenarios may differ in the level of compliance of different farm types for different SMRs and GEACs in different member states and/or (Nuts 2) regions.

The user interface will lead the user through the following successive steps:

1) Select a predefined scenario of additional compliance, and re(de)fine the level of compliance of farm types for (groups of) standards in selected nuts2 regions and/or member states
2) Compute all impacts of the refined scenario
3) Select the indicators for which to view the results
4) Select the scenarios to be viewed and choose a type of output (spider graph, table, map).

The following figures offer an impression of the way the tool might look. Although the tool will probably look different after implementation, these pictures are used to clarify the functionalities and restrictions of the tool.

Step 1: Select and refine a scenario of compliance



The figure above shows how the user will be enabled to redefine a selected scenario.

On the left side of the screen the user can select a scenario, farm type, the scale and the region.

On the right side the user can change the scenario specifications by adapting the level of compliance of different Standards groups. The standards will be grouped according to similarity in impacts.

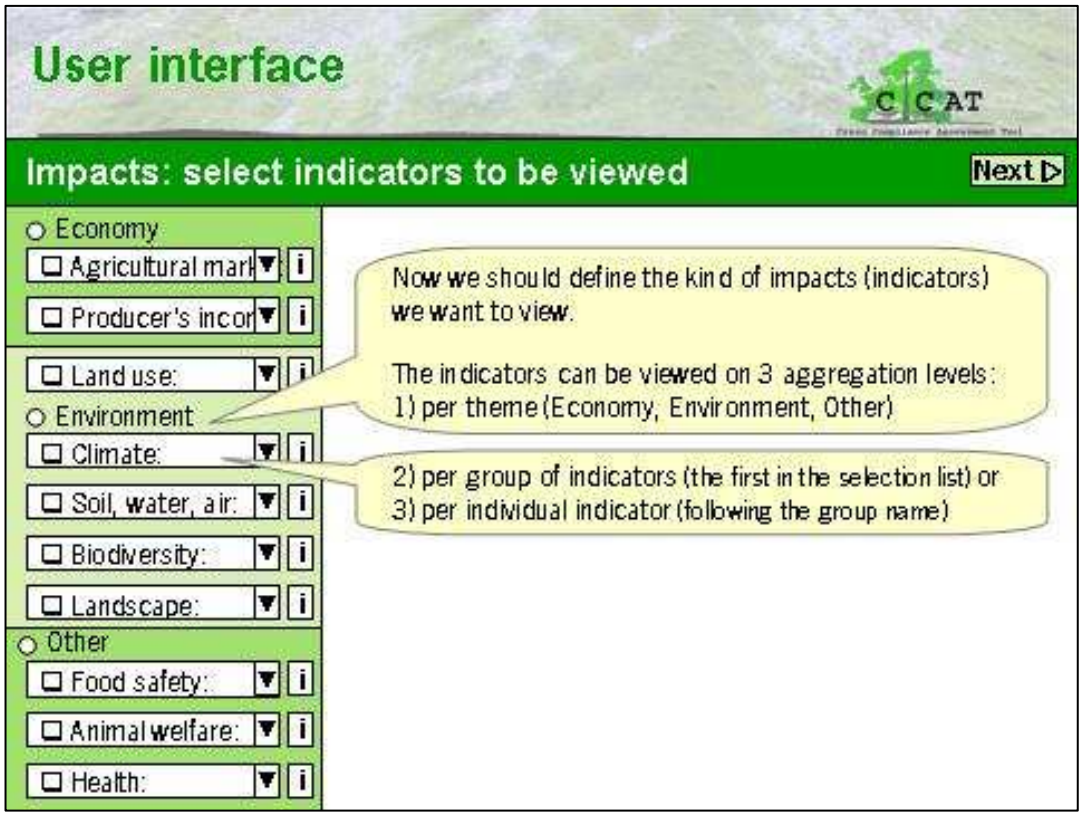
In the down left corner the “Save” button allows the user to save the refined scenario under a self defined name.

Comment:
The picture shows how the user can change the level of compliance for each standards group individually. But it should also be possible to change (with one click) e.g. the level of compliance of all farm types for all standards with a certain percentage in relation to the chosen scenario (e.g. the base line scenario). After saving such a scenario, a next step of refining could be to change the compliance level of one or several farm types in one or several selected member states.

Step 2: Compute all impacts of the refined scenario:

After clicking the “Go” button (down left) all the impacts of the refined scenario will be computed. We aim to restrict the computation time for one scenario to several minutes at the most.

Step 3: Select the indicators for which to view the result



Once the impacts of a scenario are computed, the user may select the indicators to be viewed. The figure shows a way in which the indicators might be grouped and aggregated. We plan to offer three aggregation levels:

1) per theme
2) per group of indicators
3) per individual indicator

If the user selects e.g. the theme "environment", the aggregated impact of all the environmental indicators will be shown. If all three themes are selected, than the aggregated impacts of all three themes will be shown in e.g. one diagram.

If the user selects e.g. the group name "Climate" (the first in the selection list), than the aggregated impacts of all the climate indicators will be shown. But the user may also select one or more individual indicators (below the group name in the selection list) from different groups or themes.

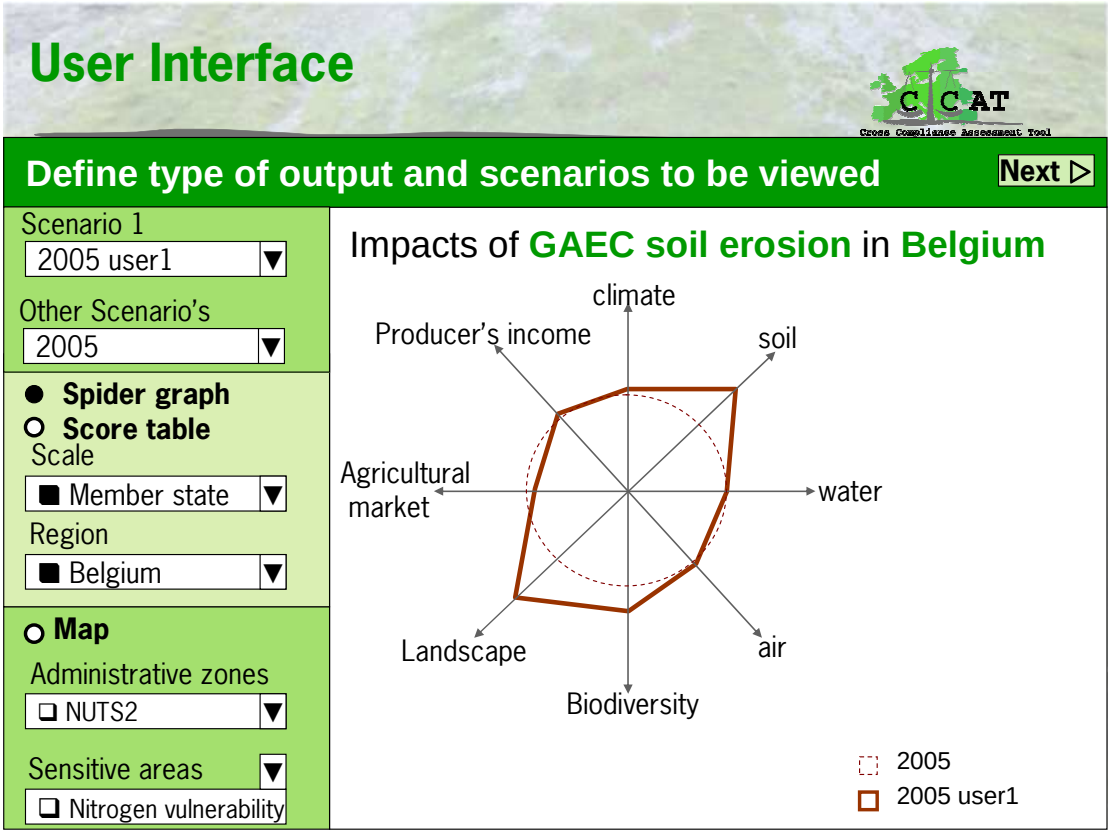
In the next step the user may indicate of which scenario(s) the impacts must be shown and in what way.

Comment

The distinction between themes as shown in the figure above, might be different after implementation of the tool and in successive versions of the tool. E.g., we expect a large overlap between the indicators for land use, landscape and biodiversity, so we might decide to distinguish in prototype 1 only one theme: landscape and

biodiversity. In prototype 2 the theme Land use might be used to view predicted changes in land use for clarification of predicted changes in land use related indicators like land use evenness and share of intensive versus extensive land uses, both indicators that are considered for biodiversity and landscape.

Step 4: Select the scenarios to be viewed and choose a type of output



Once the indicators are selected the user will be enabled to select one or several scenarios of which the results should be viewed (top left part of the figure above).

The user may view the results of one scenario (e.g. a user defined scenario), or he may view the results in relation to another scenario (e.g. one of the pre-defined scenarios), e.g. in a spider bar as shown in the figure above.

In the figure the output types Spider graph, Score table and Map are mentioned, but other types might be included, e.g. bar charts that are e.g. very suitable for the comparison of aggregated results of several scenarios in one graph.

In addition, the scale and region should be input: are the results to be viewed for the whole of EU, or for a specific member state or nuts2 region.

The output type *map* is especially suitable to show how one (aggregated) result differs between member states or Nuts2 regions. In the first prototype we will only show the results per administrative unit (Member states and nuts2 regions). In prototype 2 we hope to show the impacts also in relation to other units (e.g. Nitrogen vulnerable zones).

3 Internal and external end-user requirements

In this chapter first a description is given of the response of the end-users to the CCAT-DEMO and their requirements to the CCAT tool as obtained during the first CCAT end-user meeting held in Brussels in May 2007 and bilateral discussions with end-users after the end-user meeting. This is followed by the internal requirements to the system as obtained from all CCAT partners collected in internal meetings and a survey.

3.1 External end-user requirements: Outcome of the first end-user meeting

On the end-users meeting the demo was presented as described in the previous chapter. The response of the end users referred to the following issues:

- Data availability within the tool

CCAT project participants will initially include as much information as possible in the tool that is needed for doing an impact assessment of CC. This implies that CCAT will need to collect a lot of information on how CC is implemented in the different Member States and regions in EU and also on level of Compliance of different farmers at different points in time. Much spatial and statistical EU wide data sources are also needed as input for the models to do the assessment in the different regional context. However the tool to be developed should be flexible enough to allow the users to input their own data and their own information on changes in levels of compliance.

- Specification of the scenarios

In prototype 1 of the tool scenario refer only to the level of compliance specified per farm type per region for both GAECs and SMRs. Pre-cocked scenarios will be available in the tool, but the users of the tool should be able to adapt the scenario's with on data on levels of compliance, at least in the baseline situation. For prototype 1 the baseline situation will be the levels of Compliance in 2005. This level will entail a very varied situation in which different regions and different farm types have different baseline compliance levels. Other compliance levels to be assessed for prototype 1 are a 75% and a 100% Compliance level. Estimates of the 2005 compliance levels can partly be derived from other studies (e.g. the IEEP evaluation study and the Cross Compliance project estimates). However, where this information is missing, which is most strongly the case for all animal welfare and public health related SMRs, own estimates will need to be made based on additional data collection.

- The possibility to assess impacts
- Pre-defined impact indicators are included in the system which will be calculated for the different scenarios of compliance specified. The indicators will be selected before hand based on what is possible given the models, data and knowledge available to the project. A further description of what indicators are specified in

prototype 1 is given in next chapter and more extensively in D2.3 and D4.1.1, D4.2.1, D4.3.1 and D4.4.1.

- Taking account of penalties for farmers

In prototype 1 of the Tool penalty levels are not taken into account. However for prototype 2 the aim is to further adapt the CAPRI model to make predictions on the level of Compliance, which is a function of the penalty of not complying (which will be specific per region) and the costs involved for the farmer to comply with GAECs and SMRs. So the influence of penalties is important to make predictions on the level of compliance. This also means that the scenarios in prototype 2 will differ according to the level of a penalty or the level of compliance.

- The validity of the models to be used.

End-user found it very important that the CCAT results are based on high quality models, or that at least it is proved that the model predictions have a high validity.
In the CCAT project we only work with existing models which have already been calibrated in different projects and on which several scientific publications have been produced. It is true that models have many limitations and we should be very clear in CCAT about error margins of models. Information on this should be provided with the meta-information given per model. It should be avoided to assess impacts of CC standards that are so small that the differences between the outcomes of the scenario results are smaller then the error margins of the models.

Other questions raised during the first end user meeting were:

- The way permanent pastures will be handled
- The way the data collection for the models will be performed
- How the outcome of the health check will be used
- How to address policy changes
- Causes of the different levels of compliance between MS
- The importance of the approach being spatially explicit

A summary of the meetings minutes is included in Annex 1. Here the answers of the consortium to these questions can be found.

After the first end-user meeting a bilateral meeting was also held between the CCAT project leader and two CC specialists working with DG-AGRI (See Annex 2).

The main message from this meeting was that CCAT should ensure that the assessment of the effects of cross compliance is based on a correct interpretation of regulation 1782/2003, as well as of the rationale of the policy. This means that GAECs and permanent pasture rules represent new obligations for farmers directly introduced by cross compliance (insofar GAEC obligations are not based on already established practices at farm level, e.g. GFP), SMRs are part of pre-existing obligations and have to be respected by farmers independently from cross compliance. This means that effects of SMRs cannot directly be related to CC.

Following this reasoning the CCAT tool should be seen as a broader instrument that does not only aim at assessing the impacts of CC but in general the effects of SMR and GEAC standards.

CCAT results can be interesting for DG AGRI for as far as they relate to effects of GAECs and the permanent grassland obligation, as well as of increasing compliance levels. There were a couple of issues mentioned which were of most interest to DG-AGRI:

1) Results of endogenising level of compliance in CAPRI based on two predictive parameters: penalty levels and the chances for getting caught.
2) Effects of permanent grassland obligation on environment and in terms of costs (efficiency)
3) Case study results where in-depth analysis shows the spatial differentiation of CC effects between regions rather than at national average.

3.2 Internal requirements to the CCAT prototype I version

The following user requirements and decisions for the CCAT prototype1 were obtained from the CCAT partners during internal meetings and a survey:

SMRs and GAECs and spatial scale:

The following SMRs and GAECs will be assessed in prototype 1 at the mentioned spatial scale (according to Deliverable 2.3):

SMRs and GAECs	**Prototype 1**	
	Assessment level	***Impact field***
Nitrates Directive	NUTS2	MWALBL_U
Wild birds Directive	NUTS2	LB
Habitats Directive	NUTS2	LB
Sewage Sludge Directive	NO	
Ground water Directive	NO	
Animal Registration Directive	NATIONAL, NUTS2	MP
Bovine, Ovine and Caprine Animal Registration Regulation	NUTS2	MP
Food Law Regulation	NO	
Regulations on the hygiene of foodstuffs and food of animal origin	NO	
Regulation on requirements for feed hygiene	NATIONAL	P
Soil erosion-minimum coverage	NO	
Soil erosion-minimum land management	NO	
Soil erosion-retain terraces	NO	
Soil organic matter-standards for crop rotation	NO	
Soil organic matter-appropriate stubble management	NO	
Soil organic matter-appropriate machinery use	NATIONAL	P
Minimum level of maintenance-minimum livestock stocking density and appropriate regimes	NATIONAL	P
Minimum level of maintenance-Protection of permanent grassland	NUTS2	MWAL_ULB
Minimum level of maintenance-retention of landscape features	NUTS2	MWAL_ULB
Minimum level of maintenance-Avoiding the encroachment of unwanted vegetation	NO	ML_ULB
Minimum level of maintenance-Maintenance of olive groves	NO	ML_ULB

M=market & producer income; W=water quality; A=air and climate; S=soil quality; A_W=animal welfare, P=public health; L_U=land use; L=landscape; B=biodiversity.

It will not be feasible to assess all SMR's and GAECs separately; it will be necessary to group the standards according to similar impacts and show the impacts of these "packages".

Level of compliance

- For the first prototype we will not be able to make the level of compliance endogenous in CAPRI
- The starting point of all assessments should be a 2005 compliance level, which is the baseline year against which all other compliance levels can be compared. This

level will entail a very varied situation in which different regions and different farm types have different baseline compliance levels.

- Further scenarios to be assessed in prototype 1 include a 75% and a 100% compliance level

Economic and Environmental assessment:

- In the first prototype only the models MITERRA (for environmental impacts) and CAPRI (for economic impacts) will be used.
- The selection of economic and environmental indicators for prototype 1 depends fully on the indicators that are available in the model combination of MITERRA and CAPRI (see Section. 4.1), which must be linked to SMRs and GEACs with clear economic and environmental effects.
- The scenarios will mainly be based on the current parameterization in MITERRA-EUROPE (2000, 2010, and 2020); however, within CCAT we will use the year 2005 as the reference year and the year 2015 as the projection year.

Land use, Landscape and Biodiversity assessments:

- Only a few of the proposed indicators will be included because of lack of adequate data (see Section 4.1), and the impacts on land use, biodiversity and landscape will be assessed together.
- Three types of assessments will be performed (see D4.3.1):
  1 Effectiveness of standards for biodiversity and landscape
  2 Land use based impact assessments
  3 Impacts of environmental indicators on biodiversity

Public Health assessments

In the first prototype of the tool only EU-wide indicators (at European scale) will be involved. Therefore only 6 of the already selected indicators will be implemented :

- **WHO:** Environment and health indicators: Incidence rate for all type of food-borne illness, food-borne infections & intoxications per 100000 population: The indicator data is available on European level (EU 15 and EU 25) and on national level (NUTS0: 25 Member states with few data gaps).
- **Eurostat:** Indicators of public health: Occurrence of salmonellosis: The indicator data is available on European level (EU 15 & EU 25) and national level (member states EU 25).
- **Eurostat:** Indicators of public health: Government investments in food safety measures: The indicator data is available in most Member states (NUTS0) of the EU 15. They can be aggregated on European Level.

Own developed indicator data:

- **Number of offspring per sow/cow per year:** Reliable indicator data on NUTS0-level is available in the CAPRI data base up to the year 2004. On NUTS2-level the CAPRI data is not reliable. Moreover there is Eurostat data available up to the year 2007.

- **Average milk yield per cow per year (l/cow):** Reliable indicator data is available in the CAPRI data based on NUTS0, NUTS1 and NUTS2 level until the year 2004. Further data is available in the Eurostat database up to the year 2006.
- **Degree of compliance**: Data from the IEEP-Project „Evaluation of the application of cross compliance as foreseen under regulation 1782/2003“ can be used. This data includes in addition to the total numbers of SMR inspections and breaches the proportions of breaches by SMR on NUTS0 level.

These assessments will be done on national level.

Technical requirements/decisions for the framework of prototype 1

- The systems architecture must follow the concept of low coupling. Very loosely coupled systems have the advantage that they tend to build more quickly and also can be maintained, reused and scaled more easy: with low coupling, a change in one module will not require a change in the implementation of another module.
- Starting point of the CCAT prototype 1 architecture is the existing GAMS-environment that includes the models Miterra and CAPRI, and the Graphical User Interface (GUI) of Miterra: the GAMS Simulation Environment (GSE). This requires a GAMS installation and licence (which implies that the final tool will require a server based architecture).
- The existing user interface must be extended with a screen to select and quantify the levels of compliance of (groups of) SMRs and GAECs per MS, NUTS2, or for the whole EU.
- The computation time of all indicator assessments of one scenario should preferably be less than 5-10 minutes; the computing speed of Miterra is sufficient, but for Capri a modification will be required (see chapter 4 and D4.1).
- In prototype 1 the (partly qualitative) impacts assessments on land use, biodiversity and landscape, public health and animal welfare will probably be done outside the framework (in Microsoft Excel).
- The framework will work with fixed spatial units (having fixed boundaries) to which the input data will be related.
- The framework must be able to export results at least in the following formats: Excel, Access, CSV, XML and Arcview shapes (The GSE user interface makes it possible to export results in Excel, Word, Access, SPSS, ASCII, CSV, GDX, GAMS-data file and HTML).

4 Preliminary system design

In this chapter first an overview is given of the indicators that will be implemented in the first prototype. Next a description is given of the preliminary design of the CCATool prototype I, in terms of general technical design and functionalities.

4.1 Overview of selected indicators

In this section an overview is given of the indicators that will be implemented in the first prototype of the CCAT tool (according to D2.3).

4.1.1 Selected economic indicators:

The selected economic indicators for prototype 1 are provided in Table 4.1. As Table 4.1 shows it is expected that most indicators can be implemented within the CAPRI modelling framework. Since the CAPRI model does not work at the individual farm level, but distinguishes certain farm types and their relative production shares, the lowest level at which indicators will be evaluated is at farm group level per region. For more details, we refer to Deliverable 2.3, Section 2.2 and to Deliverable 4.1.1.

Table 4.1 Selection of economic indicators for prototype 1

Indicator	Unit	Spatial resolution	details	Comments
Gross margin/hectare[1]	euro/ha	Nuts2	Production activity	Crop specific, hectare-specific for missed crop rotations?
Land price	euro/ha	Nuts2	Arable- and Grassland	Arable- and grassland
Production of main agricultural products	ton	Nuts2	Production activity (output)	
Land allocation	ha	Nuts2	Production activities	Absolute, can also be presented in share from
Export/Import ratio of main Agricultural Products	ratio	Member States	Production activity (output)	What level of aggregation?
Budgetary expenditure	thousand euro	Nuts2	Agricultural sector	Direct payments may be provided separately per hectare for certain regions/activity types? Exp.subs etc calculated at EU level
Costs of controlling CC[2]	thousand euro	Nuts2	CC measure	

[1] This indicator can also be interpreted as an indicator of competitiveness.
[2] This indicator is made conditional on availability of information about monitoring and inspection costs, and will be only taken into account if compliance is endogenized.

Welfare changes related to agricultural production	thousand euro	Nuts2	Agricultural sector	Producer surplus
Agricultural Income (sectoral)	thousand euro	Nuts2	Production Activity	Calculated profits (short-run) and long-run (accounting for imputed land costs?)
Costs of compliance	euro/ha	Nuts2	Production activity	Per hectare, or per activity level? E.g eartag costs per cow rather than per ha?
Competitiveness: change market share	Percentage shares	Member States	Production activity (output)	Shares in national and EU production?

4.1.2 Selected environmental indicators

Table 4.2 provides the selected environmental indicators for prototype 1, all calculated with Miterra. (In prototype 2 the models DNDC and EPIC will also be used). There are two additional environmental indicators for which it is not yet clear whether they can be covered by the models, i.e phosphate and metal accumulation (change in soil contents) and phosphate and metal leaching (occurrence in leachate and runoff water). For more details, we refer to Deliverable 2.3 Section 3.2 and to Deliverable 4.2.1.

Table 4.2 Selection of environmental indicators prototype 1

Environ-mental field of impact	**Indicator**	**Level of calculation**		
		Region	Country	EU
Air/ climate	Total atmospheric emissions of ammonia (NH_3) from agriculture in kg NH_3-N/ha/yr	X	X	X
	Emissions of methane by agriculture in kg CH_4/ha/yr	X	X	X
	Emissions of nitrous oxide by agriculture in kg N2O-N/ha/yr	X	X	X
	Gross total GHG emission from agriculture in kg CO_2 equivalents	X	X	X
Chemical soil quality	Gross carbon balance in kg C/ha/yr	X	X	X
	Gross nitrogen balance in kg N/ha/yr	X	X	X
	Gross phophorous balance in kg P/ha/yr	X	X	X
Ground and surface water quality	Nitrate leaching to ground water and runoff to surface water from agriculture in kg N/ha/yr and concentrations in water in mg/l	X	X	X

4.1.3 Selected indicators for land use, landscape and biodiversity

Only a limited set of indicators will be operational in the first prototype (se table 4.3). These indicators will be calculated on the spatial levels of NUTS2, MS and EU.

Table 4.3 Selection of indicators for land use, landscape & biodiversity prototype 1

Field of impact	**Indicator groups**	**Model output from:**
Land use/ biodiversity/ landscape	(Change in) share of UAA of intensive/extensive agricultural land uses	Capri
Land use/ biodiversity	(Change in) share of intensive livestock	Capri
	(Change in) livestock density	Capri
Biodiversity	(Change in) habitat quality derived from environmental impacts (e.g. change in quality of water, soil, air)	Miterra
Landscape/ biodiversity	(Change in) agricultural land use diversity (evenness)	Capri, (post model disaggregation)

The first three indicators refer to the change in intensive versus extensive agriculture. Agricultural intensification is one of the main drivers of biodiversity loss in the European agricultural habitat as well as loss of landscape diversity.

The indicator *Agricultural land use diversity change* will be estimated by computing the evenness of agricultural land uses per Nuts2 region on groupings of the land use types of the CAPRI model. From literature it is well known that landscape diversity has a positive influence on biodiversity in general (see Deliverable 4.3.1).

The indicator on *Change in habitat quality* can be derived from the output produced by the environmental models in relation to water, air and soil quality. For the first prototype the output of the environmental model MITERRA (in the form of environmental indicator values) will be used as input for a qualitative assessment of effects on farmland biodiversity within regions.

Apart from the indicator assessments described above, an expert qualitative judgment of the **effectiveness of the standards** related to the Birds and Habitats Directives and habitat/landscape directed GEACs will be estimated. In this way a direct link between the Cross Compliance measures and their targets will be established.

Because the mentioned land use and landscape indicators are also important for biodiversity, the assessments for land use, landscape and biodiversity will be performed together.

In prototype 1 no distinction will be made between different impact fields, so the impacts will be assessed for land use/landscape/biodiversity together and as a whole.

For more information we refer to D2.3 (Chapter 4) and D 4.3.1.

4.1.4 Selected indicators for public animal welfare and health

The indicator data for the first prototype of the tool is available on European level most of the indicator data for the second prototype will be assessed locally. The assessment specifications of the selected indicators for the first prototype are given in the following table 5.3.

Table 4.4 Selected indicators for animal welfare and public health prototype 1

Selected indicators for prototype 1	Dimension of indicators	Data source	Spatial resolution
Incidence rate of food-borne illness, infections and intoxications	Number of cases per hundred thousand population and year	Who (EU25) Annual (1987-2005)	NUTS0
Government investments in food safety measures	million € / year	Eurostat (EU 15) Annual (1991-2006)	NUTS0
Occurence of salmonellosis	Occurrence per 100000 people and year	Eurostat (EU25) Annual (1995-2005)	NUTS0
Own development:			
Degree of compliance	Proportion of breaches by SMR / Breaches as a percentage of inspected farms / Percentage of non-compliant farms per year	IEEP (EU 25 with few gaps) Scenarios	NUTS0
Milk yield	Milk yield per cow per year (kg/cow)	Eurostat CAPRI	NUTS0-2
Number of offspring	Number of offspring per cow / sow per year	Eurostat CAPRI	NUTS0-2

Where the first three indicators might be self-evident and not in need for further motivation, some additional remarks about the last two (milk yield and number of offspring) are appropriate.

As regards the inclusion of the milk yield per cow as an animal welfare indicator, the intuition is that the occurrence of udder diseases (e.g. mastitis) causes physical suffering of the cows and it also leads to a reduction of the milk yield in comparison to the potential yield under normalized or healthy conditions. Given that in most cases udder diseases are a result of poor hygienic conditions the annual milk yield of a cow can be used as performance and response indicator for animal welfare.

A final performance indicator that will be used in the Prototype 1 tool for assessing animal welfare is the number of offspring per cow / sow and year. Under poor animal welfare conditions the reproductive instinct of farm animals is reduced as compared to normalized conditions. It is realized that these 'normalized conditions' can vary over member states partly because of differences in farming practices, genetic quality, and entrepreneurship.

For more information we refer to D2.3, Chapter 5.2. and D4.4.1.

4.2 Technical implementation

4.2.1 Architecture

Starting point of the CCAT prototype 1 architecture is the existing GAMS-environment that includes the Environmental model Miterra, the economic model CAPRI and the Graphical User Interface (GUI) of Miterra: the GAMS Simulation Environment (GSE). It is realized as a 3-tier client-server architecture consisting of :

- a front-end or "client-application" (GUI)
- a component framework triggered by the front end including a number of cooperating components and
- a persistence layer (database).

The components are free to define their own database requirements.

The existing user interface takes care of model scenario control. It allows defining new scenarios, running those scenarios, presenting results in a multidimensional data viewer and exporting results towards a variety of formats like Word, Excel, Graphs, and polygon maps. The GUI also allows direct comparison of scenarios in all presentation forms.

The interfaces between the GUI and the model(s) are controlled by meta-information files and batch files (to process the run-off of the models, see figure 1).

For CCAT the GUI must be extended with a screen to select and change the compliance levels of (groups of) standards on different spatial scales (MS, NUTS2) and the application framework has to be extended with a component to link the measures to model parameters (PMaP, Parameter Modification and Provision). The purpose of this PMaP is to translate the measures used in CCAT to parameters used by the models.

For more information on the architecture we refer to D5.1. The technical design is however still under development, therefore the design might still change in a later stage of the project.

For more information on the CAPRI model we refer to D4.1.1.

For more information on the Miterra model we refer to D4.2.1.

Figure 1 provides an overview of the software architecture of the prototype 1:

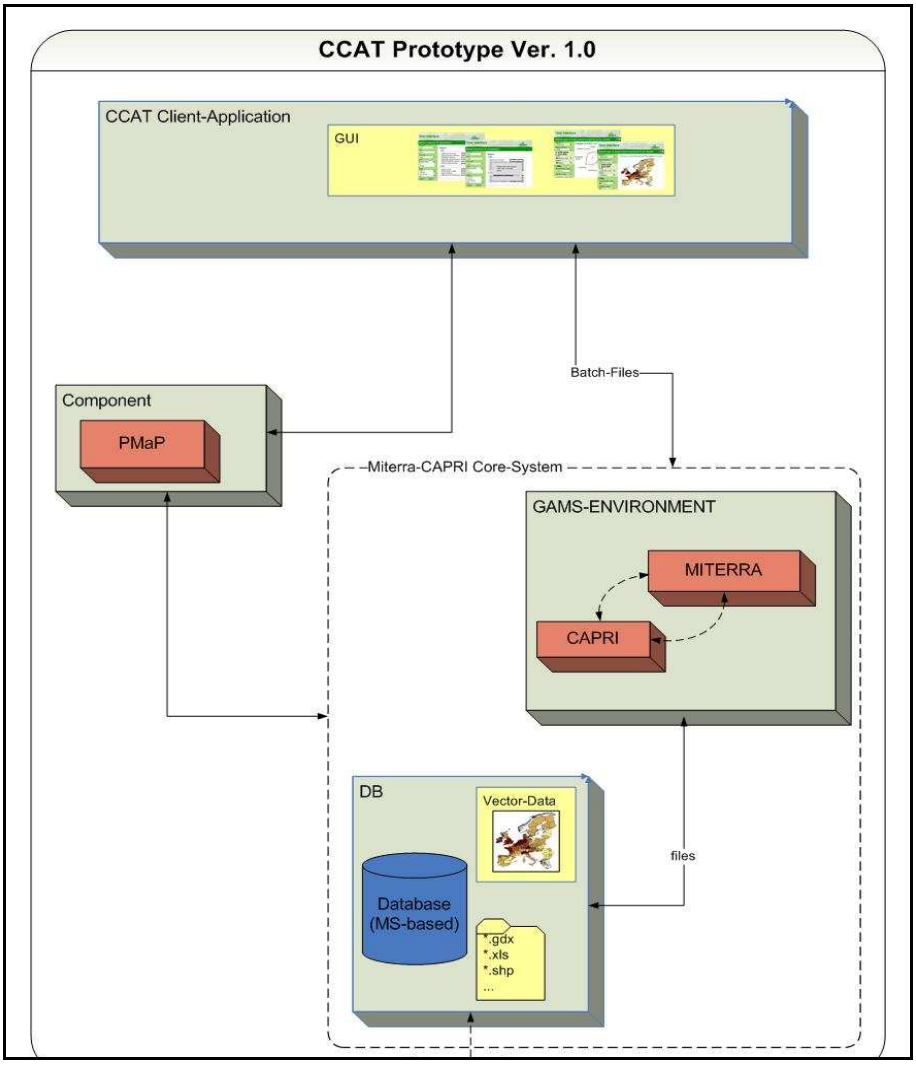


Figure 1: Overview of the CCAT prototype 1

The final CCAT Client application is expected to be a user friendly tool. This implies among other things that data should be stored in well known format. Furthermore most potential end users prefer a reasonable, e.g. less than 10 minutes, time for calculation of results. Miterra is a fast model, but for CAPRI modifications are required to meet these demands.

4.2.2 CAPRI modifications

First a procedure has to be implemented that allows reduction of solution time from actually 45 minutes to less than 5 minutes. This will be done by pre-calculation of the equilibrium market price (pre-processor in fig 2), instead of the time consuming 15 iterations to an equilibrium between supply and price of the standard Capri, enabling a single solve of the supply module to simulate farmers supply response at regional level, which will cost only a few minutes time.

Secondly the CAPRI modelling system has to be adopted to allow data exchange with well known data base programmes like ACCESS. Most of the indicators discussed in

D5.1 are already calculated by the current CAPRI modelling system, but all CAPRI data is stored in an efficient but software specific data format (gdx). The software language "gams" underlying the CAPRI model has however features allowing data exchange with well known software packages, so this modification will not be problematic.

4.2.3 The exchange of data between CAPRI and MITERRA

The exchange of data between the CAPRI and MITERRA model was already established in former projects. The main information passed to MITERRA are activity levels and fertilizer (mineral and manure) application rates. For efficiency reasons the data transfer from CAPRI to MITERRA will be done by intermediate, software specific gdx files.

Figure 2 gives a schematic overview of the interaction (for a detailed explanation of this figure see D4.2)

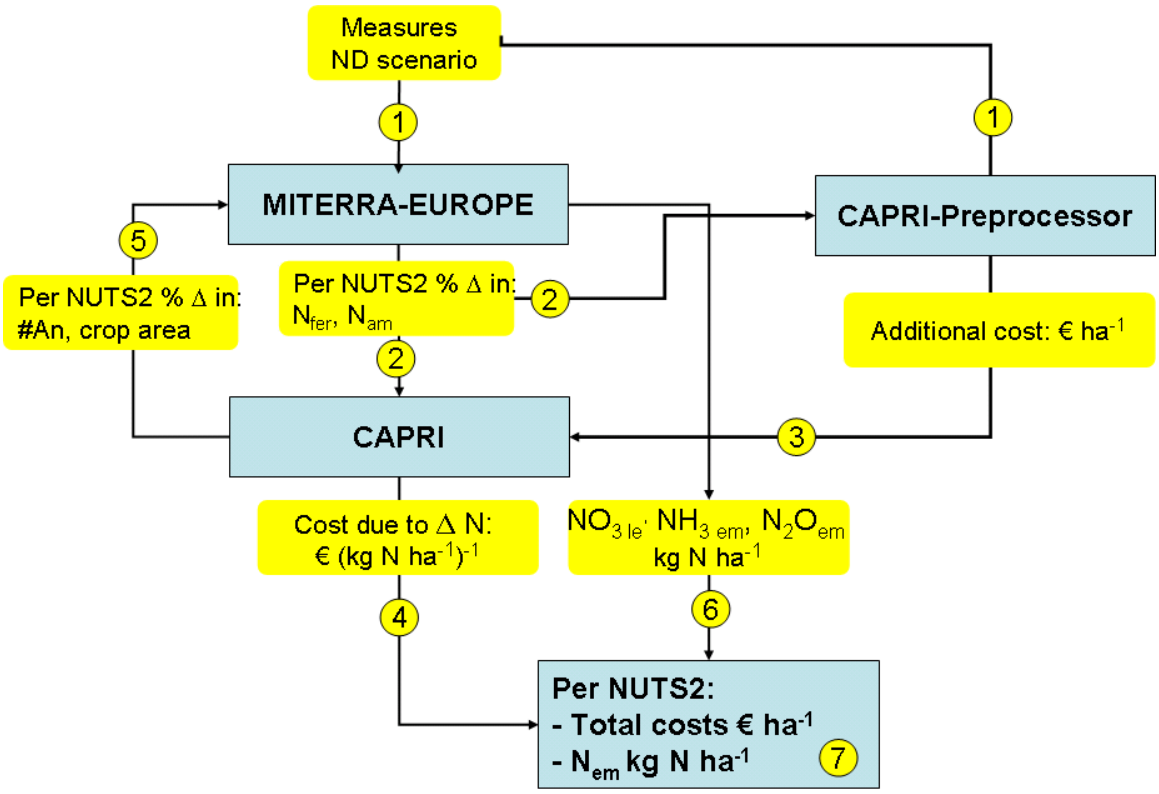


Figure 2 Schematic presentation of the interaction between MITERRA and CAPRI

More information on the CAPRI modifications and CAPRI-Miterra interaction and GAMS can be found in D.4.1.1.

4.2.4 Database management

The data exchange between Miterra and CAPRI is made with GDX-files (internal GAMS files). Other input data which Miterra uses, are currently in Excel-files. For improving the performance of Miterra these excel files are first read and written to a GDX-file. However, the GSE GUI makes it possible to export the results in Excel and Access.

To make the data better accessible for the users the input and output data of CCAT will be stored in the well known data base format ACCESS. Since ACCESS data bases have a limited size of 2 Gb, several databases will be needed. The meta data information of the used databases will be stored in the Access database of the Graphical User Interface (GUI).

In this GUI data base also information will be stored on compliance levels (per standards group per MS/NUTS2) of the base scenarios and user defined scenarios. Additionally, data on different model versions and their parameters will be stored, enabling to run different test versions within the same application.

The output – the user decides which results he wants to see – will also be stored in the GUI database. (However, the web based GUI (prototype 2) will probably put the data in a directory structure on the servers – this runs faster than a database on the server.) For efficiency reasons map data will also be stored in a directory structure.

4.2.5 Other impact assessment tools

In prototype 1 the (partly qualitative) impacts assessments on land use, biodiversity and landscape, public health and animal welfare will probably be done outside the framework, using simple calculation models in Microsoft Excel (which in a later stage will be included in the framework).

For the impacts on land use, biodiversity and landscape three types of assessments will be performed:
1 Effectiveness of standards for biodiversity and landscape
2 Land use based impact assessments
- change in share of intensive/extensive land use
- change in density and share of intensive/extensive livestock
- change in land use diversity (evenness)

3 Impacts of environmental indicators on biodiversity

For Public health and Animal welfare only the following three indicators will be computed for the current situation as well as for the scenarios:

- Degree of compliance
- Milk yield per cow per year (kg/cow)
- Number of offspring per cow / sow per year

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The other three mentioned indicators have no relation with the Capri model, and will only be assessed in a qualitative way:

- Incidence rate of food-borne illness, infections and intoxications
- Government investments in food safety measures

- Occurence of salmonellosis

How this will be done will is explained in D4.3.1 and D4.4.1.

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Annex 1: Summary of discussion first CCAT end-user meeting, Brussels 16 May 2007

Present: *Daniele Tissot (DG-RTD); Inge Van Oost (DG-Agri, D1 Direct support); Simon Michel-Berger (COPA-COCEGA); Martin Farmer (Institute for European Environmental Policy); Mrs. Althoff-Pegels (Ministerium fuer Umwelt und Naturschutz, Landwirtshcaft und Verbraucherschutz des Landes Nordrhein-Westfalen, Referat II-3, EG-Zahlstellenangelegenheiten); Juergen Weiler (Ministerium fuer Umwelt und Naturschutz, Landwirtshcaft und Verbraucherschutz des Landes Nordrhein-Westfalen, Referat II-3, EG-Zahlstellenangelegenheiten);*

Andris Orlovskis (Ministry of AgricultureLatvia); Kaj Sanders (Ministry of Environment and planning, The Netherlands); Jaume Sió Torres (Miniterio de Innivación Rural, Junta de Andalucía); Knud Mortenson (Directorate for Food, Fisheries and Agri Business, Denmark); Duncan Johnstone DG-Env B1 Agricultural Sector); Maryline Loquet (Ministère de l'Agriculture et de la Pêche); Till Hoffstadt (Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz); Rolf Selg (Federal Ministry of Food, Agriculture and Consumer Protection of Germany); Ana Isabel Antunes (Ministry of Agriculture Portugal); Laura Enfedaque Diaz (Ministry of Agriculture Spain) Anne Doorn, van (Alterra); Janneke Roos-Klein Lankhorst (Alterra); Onno Roosenschoon (Alterra); Berien Elbersen (Alterra); Floor Brouwer (LEI); Bettina Rudloff (Institute for Food and Resource Economics, University of Bonn)

Introduction:

The meeting started with a welcome by the project coordinator (Berien Elbersen) and a short introduction to the CCAT project objectives. This was followed by a presentation on the CC research activities by DG-Research by Daniele Tissot (DG-research) project officer of the CCAT project. Floor Brouwer (LEI) then gave an introduction on the state-of-play and how the assessment of impacts is approached in CCAT. Bettina Rudloff (University Bonn)then gave a presentation of how Cross Compliance (CC) impacts could be assessed on agricultural markets, farm income, animal welfare and public health. Berien Elbersen (Alterra) did the same for assessing CC impacts on environment, land use, landscape and biodiversity and explained how CCAT is intending to do an integrated assessment of different impacts of CC. The presentations by the CCAT consortium were then finished with a demonstration by Onno Roosenschoon of the future Cross Compliance Assessment Tool to be the main output of CCAT. All presentations given are accessible on the CCAT website: www.CCAT.nl

Discussion

After the presentations questions and comments were raised by the participants of the meeting. The main points are given in the following:

Question: Who is entering the data in the tool?

Response: The CCAT project participants will initially include as much information as possible that is needed for doing an impact assessement on CC. This implies that CCAT will need to collect a lot of information on how CC is implemented in the different Member States and regions in EU and also on level of Compliance of different farmers at different points in time. Much spatial and statistical EU wide data sources are also needed as input for the models to do the assessment in the different regional context. In principle the CCAT models will mainly produce the outcome and the tool already includes the rules for compliance, SMRs etc for the different assessments under different types of Compliance. However the tool to be developed should be flexible enough to allow the users to input their own data and their own information on changes in levels of compliance.

Question: How are the scenario's specified? Is it in terms of different legislations or something different?

Response: At this moment it is expected that the scenario refers to the level of compliance, the other complicated information (concerning differences in GAEC standards, SMR implementation pathways) is already included.

Question: How is the data abstraction (in relation to the models) carried out?

Response: The assessment will be from 2005 onwards. The tool is meant to assess effects of CC also with limited data availability. This means that if we do not know the real level of compliance in a region by a certain group of farmers we can still make assumptions and assess impacts at different levels of compliance.

Question: Is it a possibility to asses the impacts?

Response: yes, that's what we aim at. Different impacts on agricultural markets, farmer's income, environment, land use, biodiversity, animal welfare and public health.

Question: What are the rules on permanent pasture?

Response: This still needs to be defined, but will be included in relation to impact on land use because of implementation of GAEC.

Question: Important questions are: to what baseline do you compare? And would it really be different without GAECs? But this is difficult to answer.

Question: Are the penalties for farmers included in the tool?

Response: this is a question for the CAPRI model. The aim of CCAT is to further adapt the CAPRI model to make predictions on the level of Compliance, which is a function of the penalty of not compliing (which will be specific per region) and the

costs involved for the farmer to comply with GAECs and SMRs. So the influence of penalties is important to make predictions on the level of compliance, but this information is hard to get for every region.

Question: How do you get the data for the models?

Response: There is a special WP for collecting data, decisions about how the information is going to be collected have not been made definite. It is however clear that we can get much information from other projects, but additional data collection per MS will certainly be necessary. We will have to communicate with the right persons (like the end-users). We also hope to get more information from DG-agri about implementations in different MS once the mid-term evaluation of CC this year has been finalized and information becomes less sensitive.

Question: The EU-policy people want to use this tool, but how you are going to implement the outcome of the health check (in which the goal and reach of CC will be evaluated)??

Response: this depends on the outcome of the health check, if the level of compliance change because of recommendations implemented after the health check it is interesting to assess whether this leads to increased compliance. With the tool we can try to assess whether this change in level of compliance has impacts on economic and environmental indicators. This of course can only be done if we indeed are able to derive information on levels of compliance before and after the health check.

Question: And if the policy changes?

Response: of course that depends on how the policy changes, and whether we are able to derive enough information on this policy change that we can input into the CCAT assessment tool. Our expectation is to support policy decisions and use the tool behind the lifetime of the project. Also national ministries will be interested, what kind of indicators are important for them, that is where we are interested in!

Question: The implementation of CC and the levels of control are different between MS, so this will influence the level of compliance. Can you make a comparison between MS?

Response: yes, that is possible, the level of compliance is not the only factor influencing the impact, there are lots of rules (standards of GAECs etc) behind it. The system should be developed in such a way that it indeed enables to compare impacts of CC given different implementation pathways in regions and in time. Whether we will indeed succeed to do this all depends on the data we are able to collect to be input in the assessment tool.

Question: What about the significance of the models and the data? It is often very limited!

Response: the validity and acceptance of the models is crucial, that's why this meeting is so important. In principle in CCAT project we work with existing models which have already been validated, calibrated in different projects and on which several scientific publications have been produced. It is true that models have many limitations and we should be very clear in CCAT about this.

Question: You should take care of the reasons why farmers comply, or why levels of compliance raise. Often levels of compliance increase because of other reasons and not necessarily because CC policy is implemented.

Response: Indeed this is a risk. If we collect information on changes in level of compliance we will certainly not always be able to also obtain the reasons why levels of compliance increase. The project will therefore not be able to provide an understanding of the reasons why compliance levels change, the only thing we can do is show the effect of changed compliance levels. When interpreting the results of the impact assessment we should flag this in order to ensure that users of the output interpret the result in a correct way.

Question: It is not easy to evaluate and difficult to model CC but it is an interesting approach. Issues like soil erosion and water are important for Spain. Also impacts on nitrate vulnerable zones should be different, the spatial explicit approach is important.

The measures (GAEC's) themselves should also be flexible / changeable within the tool.

Question: I need more information

Response: We will place the presentations on the web site and make a document on explaining the tool and a glossary.

Finally it was also discussed for whom the tool would be most useful. It seems that the tool is especially interesting for end-users who are interested in the effects of CC on environment and farmers income given different levels of Compliance.

Annex 2: Summary of meeting with Guido Castellano (DG-Agri G4) and Noémie Beigbeder (DG-Agri G1)

27 September 2007

Aim of meeting:

- An exchange of data from the IEEP project on the evaluation of Cross Compliance (CC)
- Exchange views on the possible effects of CC
- DG-Agri's interest in the outcome of CCAT project

1. IEEP evaluation study

The evaluation study delivered very useful information on the way CC is implemented in the different MSs, including the control systems in place. Primary data on levels of compliance and number of breaches is only preliminary as the study was performed already in 2006, which was the second year of CC implementation. However, secondary data issued by the EC on the basis of communications from the MSs is included in the evaluation report.

The results of this study consist of:

- National reports (25 MS) (these reports are not public and should not be distributed outside CCAT project!).
- Descriptive report (i.e. the European synthesis of the implementation of CC in the Member States, based on the national reports)
- Evaluation report
- 6 country case-study reports
- Summaries

The main data source for the descriptive and evaluation reports was an n investigation (mainly literature review, web based researches and interviews with key stakeholders)carried out by national experts recruited by the evaluators in all 25 MS; the information was collated into the national reports. The evaluation report provides answers to 11 questions mainly related to the effectiveness and efficiency of the policy, and has the characteristics of a mid-term evaluation considering the limited period of implementation of the policy.

In the descriptive and evaluation reports the following elements of the policy are considered. Those elements reflect different obligations for the MS deriving from specific articles of reg. 1782/2003:

1) application of SMRs;

2) definition (on the basis of Annex IV) and application of GAEC;

3) definition and application of rules for keeping the extent of permanent pasture levels;

5) systems for the management of controls;

6) systems for applying reductions and exclusion of payments; and,

7) the provision of information to farmers.

This last point is an obligation under Annex III of Regulation 1782/2003 which specifies that farmers should be informed by their governments about objectives of CC not only in relation to increasing compliance but also to creating better environmental practices at farm level and the reasons why these are beneficial for the environment. This is not the same as setting up Farm Advisory Systems (FAS) as this is only an obligation from January 2007 onwards.

2. Discussion on the effects of CC

Guido insisted on the fact that the assessment of the effects of cross compliance has to be based on a correct interpretation of regulation 1782/2003, as well as of the rationale of the policy. In this respect it is important to note that whereas GAEC and permanent pasture rules represent new obligations for farmers directly introduced by cross compliance (insofar GAEC obligations are not based on already established practices at farm level, e.g. GFP), SMR are part of pre-existing obligations and have to be respected by farmers independently from cross compliance.

Guido explains that CC policy is very sensitive in that the Commission wants it to be an efficient instrument not causing too much additional burden on both government and farmer.

Guido explained that the evaluators identified the overall objective of cross compliance as the support to EU sustainable agriculture. This can be achieved through the combined effects of the different input and outcomes of the different elements of the policy (awareness of farmers about their obligations, increased respect by farmers of mandatory requirements, comprehensive application for GAEC and SMRs etc.). He suggested to refer to the evaluation report for a deeper explanation of the policy intervention logic.

Guido explains that the above-mentioned elements have to be duly taken into account when considering the impacts of the policy. As an example, with respect to issues such as "induced changes in farmers practice" or "investments by farmers to comply with some regulations" (mentioned in the summary of the CCAT project as possible results of cross compliance) he specified that these seem to be more in relation with the implementation of Annex III legislation than to the application of cross compliance.

According to Guido, costs of CC can only be related to:

1) Controls and administration costs for government
2) Implementation of GAECs (i.e. costs for farmers for reaching compliance with the given GAEC)

3) Implementation of the obligation to maintain permanent grassland (i.e. costs for farmers for reaching compliance with the given rules for keeping the extent of permanent pasture areas)
4) Administrative costs for farmers linked with the implementation of CC (e.g. keeping records, following controls etc.).

Costs for reaching compliance with SMR cannot be attributed to CC however as these relate to EU legislation (Directives and regulations) that already existed before CC was implemented, and that therefore have to be implemented independently from cross compliance. CC policy aims at increasing the compliance with Annex III legislation by making a link between a number of agricultural payments and the respect by farmers of that legislation.

The assessment of the effects of cross compliance with respect to Annex III related areas (e.g. public, animal and plant health, and animal welfare) should be based on the assessment of the increased level of compliance by farmers due to the application of cross compliance. This was done to a limited extent under the evaluation due to the short period of implementation of the policy and the lack of long time series data.

Overall the evaluation shows that the impact of newly introduced standards (GAEC and PP rules) on farmers' costs of production and income is limited. The IEEP evaluation also concluded that the environmental effectiveness of GAECs with respect to their specific objectives is moderate because the defined GAEC are largely based on previously existing farming practices (e.g. 'good farming practices'). Furthermore, Guido recalled that cross compliance cannot be considered as an instrument targeting broad environmental problems, whereas other instruments such as the Agri-environmental measures are deemed to address environmental issues more specifically.

As regards to the definition of GAECs Guido and Noémi also explain that MS had to formulate rules for all standards described in Annex IV of Regulation 1782/2003, unless they gave a very good motivation why a certain standard was not applicable due to the specific characteristics in the area concerned. Following regulation 1782/2003, MS have to formulate GAEC standards and related obligations for farmers in light of the specific local situation in a country and/or region. Some countries seem to be going even further then the standards of Annex IV. This is for example the case for France and Spain for example which put certain irrigation prescriptions under CC and fitted them to Erosion GAECs standards. Until now this has been accepted by the Commission.

3. Possible DG-Agri's interest in CCAT results

According to Guido, CCAT results can be interesting for the DG AGRI for as far as it relates to effects of GAECs and the permanent grassland obligation, as well as of increasing in compliance levels.

There were a couple of issues mentioned which were of most interest:

4) Results of endogenising level of compliance in CAPRI.
5) Effects of permanent grassland obligation on environment and in terms of costs (efficiency)
6) Case study results where in-depth analysis shows the spatial differentiation of CC effects between regions rather than at national average.

We discussed that the endogenisation of the level of Compliance requires good long term data on changes in levels of compliance and sanction levels. MS are obliged to submit annual report on the implementation of cross compliance to the Commission (according to Article … of) which receive these reports half a year later (July) after the end of the reported year.

Access to these data for CCAT partners should be dealt with by the responsible project manager in DG RTD, who should get in contact with the relevant unit(s) in DG AGRI (G3). Guido advised us to contact our project officer and ask her to contact the relevant persons in this(those) Unit(s) to provide us with this information.

Follow-up: I will maintain regular contact with Guido on the progress of CCAT and he should be available to answer questions if relevant. Inviting Guido and other colleagues to our next end-user meeting is a good idea, but meeting informally in Brussels could also be useful and was preferred.